

Anemia in HIV-infected Patients in Vietnam: Prevalence, Severity, Mortality and Associated Factors

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Introduction

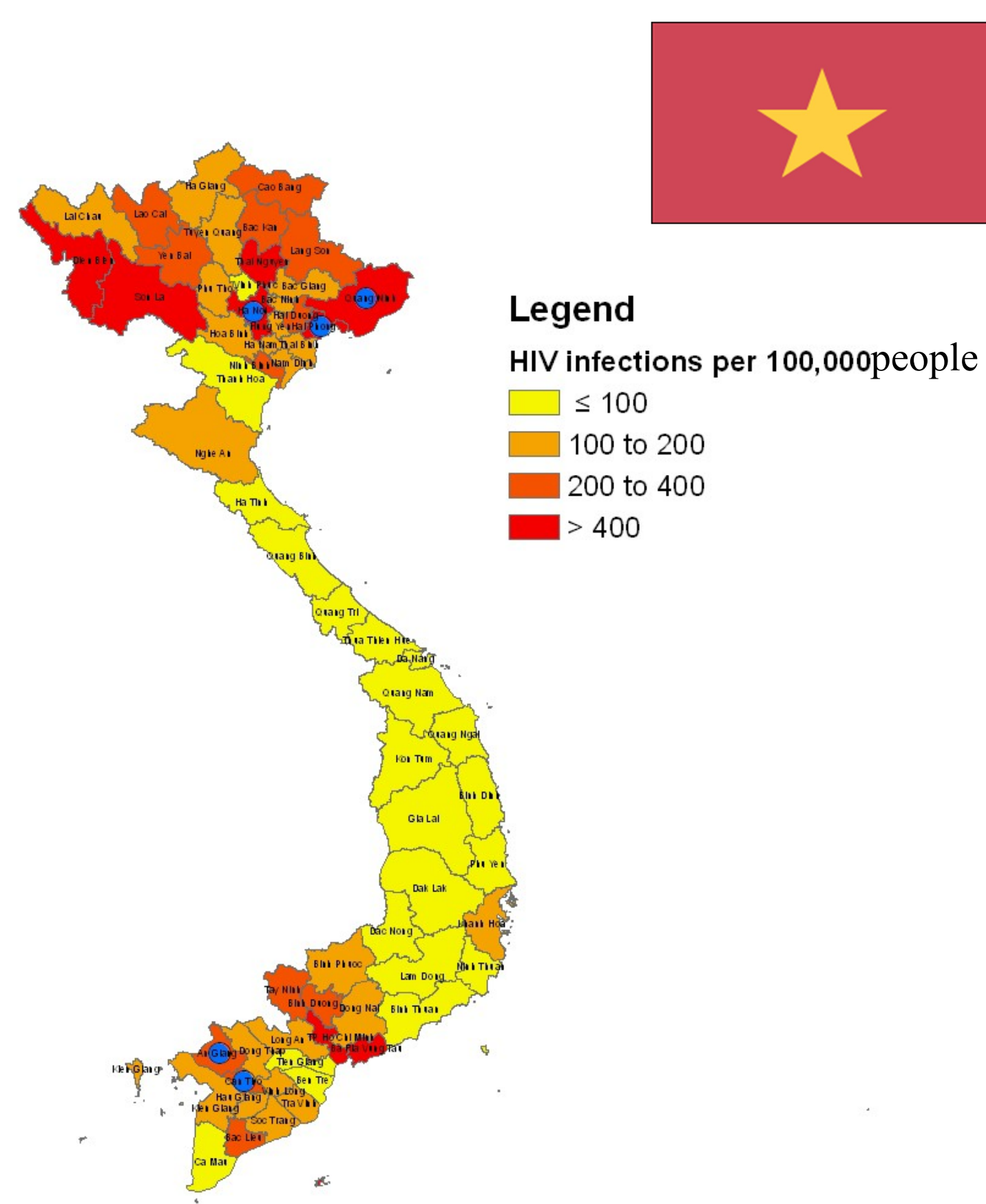


Figure 1: Map of Vietnam, HIV Prevalence by Provinces (by VAAC/MoH, 2008) and Location of the Five Clinics

- Estimated HIV cases: 293,000
- HIV prevalence: 0.53%
- Risk behaviors: IDUs, CSWs, MSM
- Current challenges: Treatment and intervention needs in close settings
- Benefits from treatment: Increase in survival
- Complications: Many, including anemia
- Anemia: Can be secondary to many causes
- Information on anemia in HIV-infected patients is not available
- No information on impact of anemia on survival rate
- Guidance on management of anemia is limited.

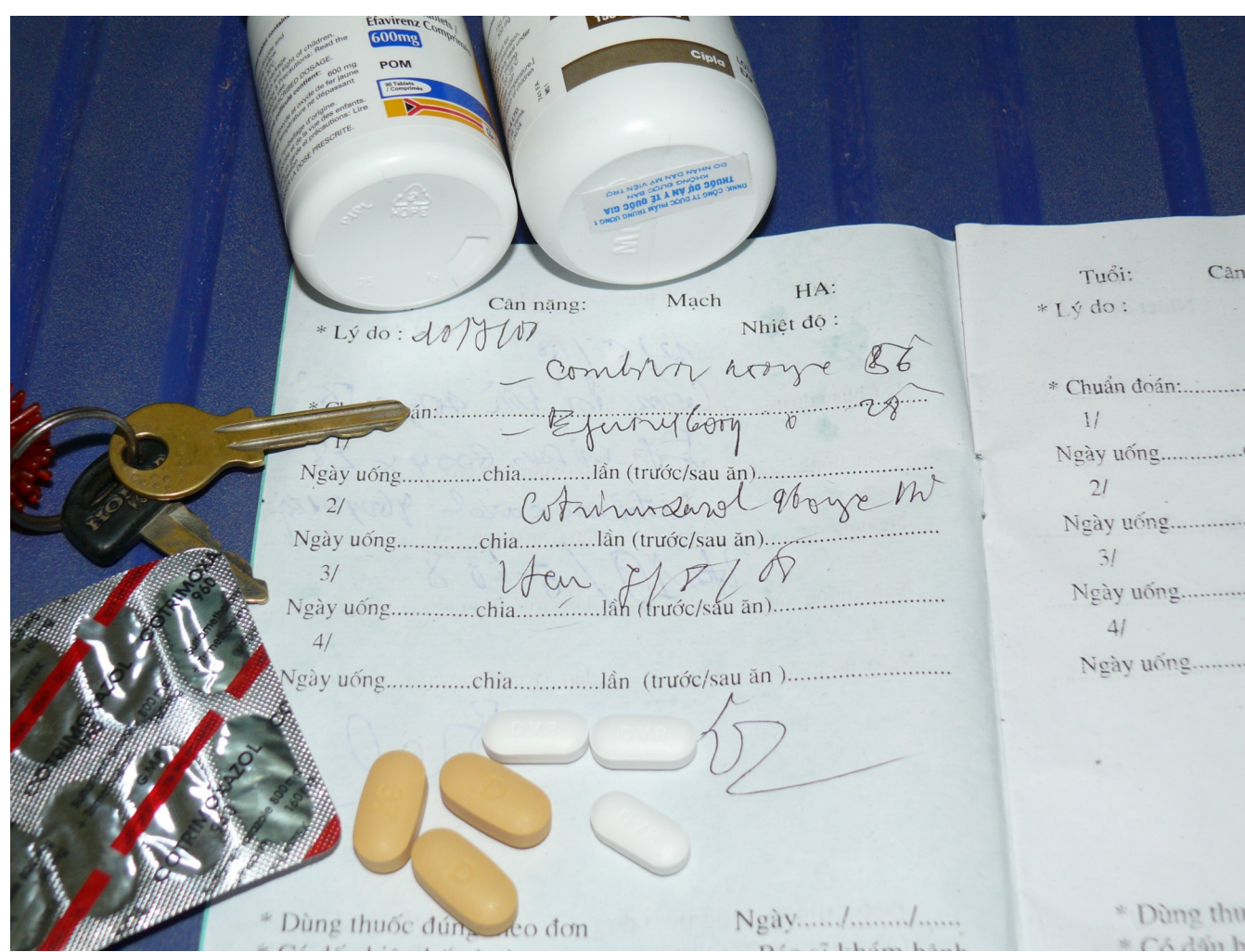


Figure 2: HIV-Infected Patients Have Accessed Free ARTs and OI Medications, mostly from PEPFAR

Materials and Methods

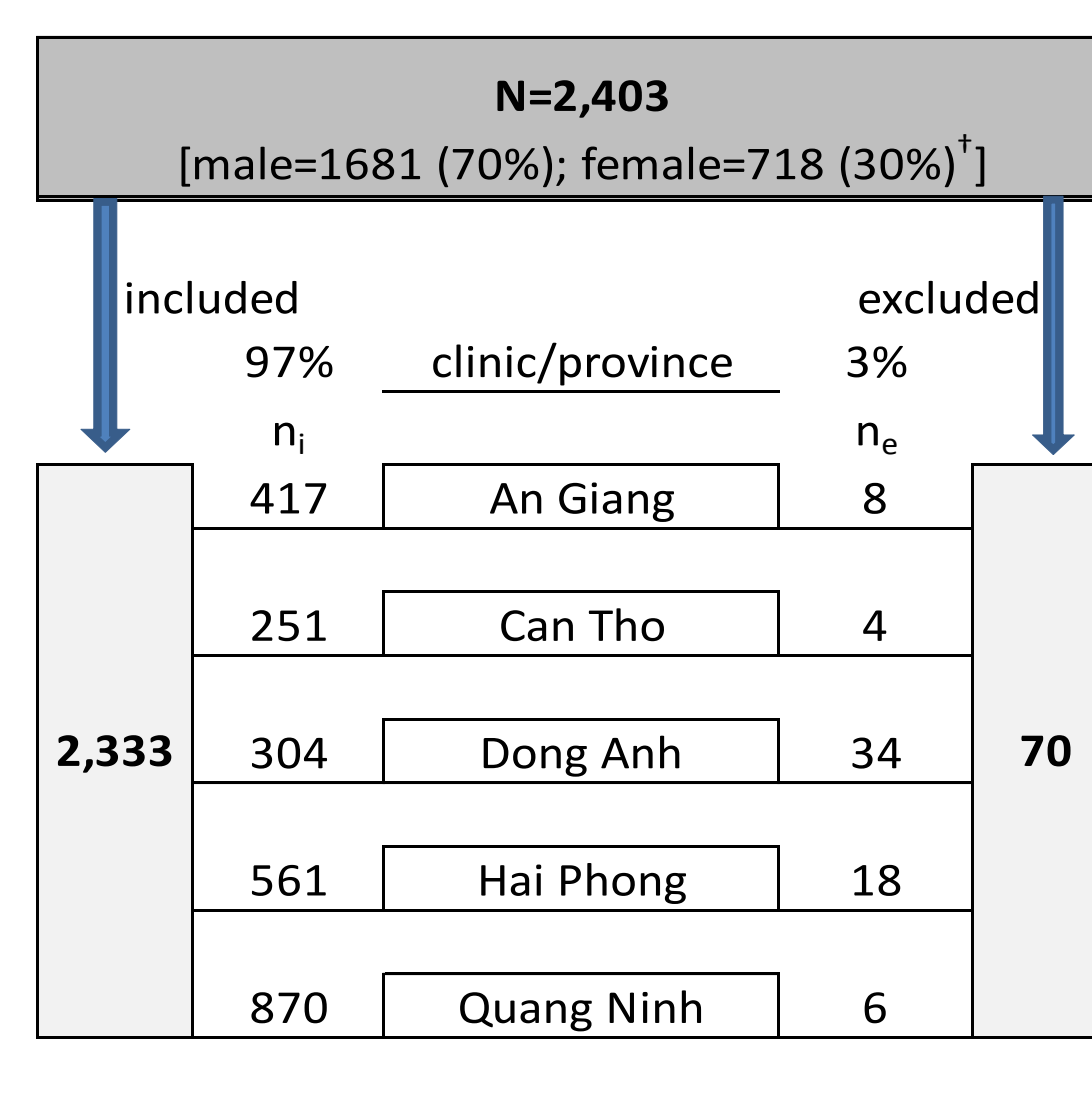
- Data from 2,403 HIV-infected patients (2005-2008)
- Outcome of interest: Anemic and not anemic per World Health Organization (WHO) guideline (Female-anemic patients have Hgb<12g/dL and male-anemic patients have Hgb<13g/dL)
- Grading of anemia: US AIDS Clinical Trial Group (ACTG) and Vietnam MoH's guidelines (8.0-9.4 g/dl for grade 1; 7.0-7.9 g/dl for grade 2; 6.5-6.9 g/dl for grade 3; and <6.5 for grade 4)
- Patient characteristics/independent variables (14 predictor variables)
- Data from national anemia survey and population survey for Direct age and sex adjustment
- Logistic regression and stratified analysis
- Kaplan Meier Method and Cox Proportional Regression Model for time to death
- SAS and SAS Micro for analysis and regression diagnosis.



Figure 3: Patient Chart Abstraction Forms of 2,403 HIV-infected Patients

Results

Figure 4: Total, included, and excluded patients in five clinics/provinces. Patients were excluded if they did not have a baseline hemoglobin measurement



[†] Missing gender (no gender identified) = 4 included patients

- Seventy percent (70%) of patients were male
- Injection-drug use (IDU) was reported by 729 (30%), other risk factors by 856 (36%)
- Median baseline CD4 for 2,025 (84%) patients was 77
- The baseline Hgb available in 2,333 (97%) of patients ranged from 4.1g/dL to 23.9 g/dL (mean=11.9 g/dL)
- Men were less likely to have a Hgb measured at baseline (p=0.02). The overall baseline anemia prevalence was 61%. Severe anemia (Hgb<6.9 g/dl) was present in 1.71%
- Per MoH guideline, anemic patients but not graded counted for 21.43% patients
- The anemia prevalence in this AIDS cohort was two times higher than the general population in Vietnam (61% vs 30%)

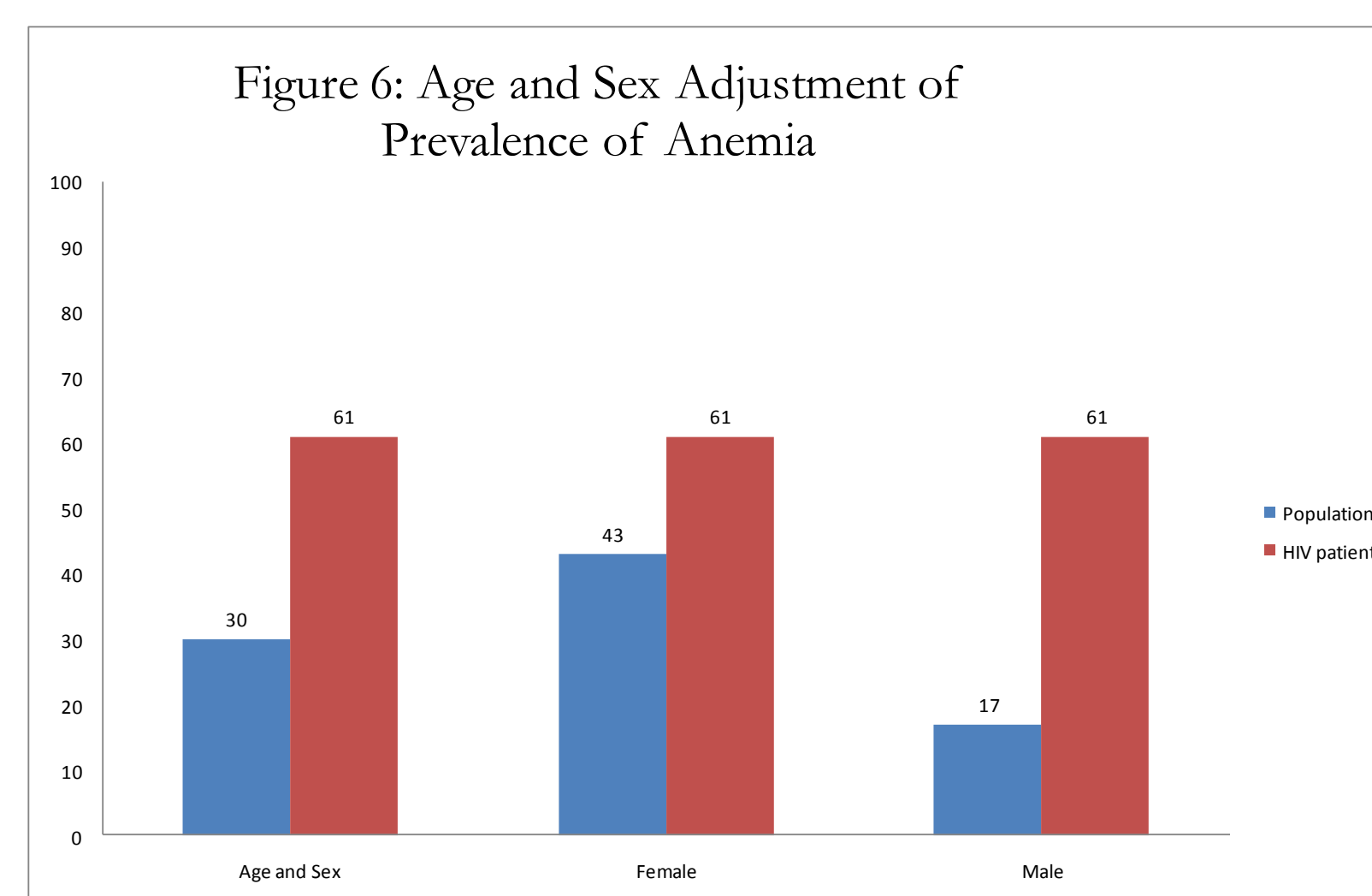
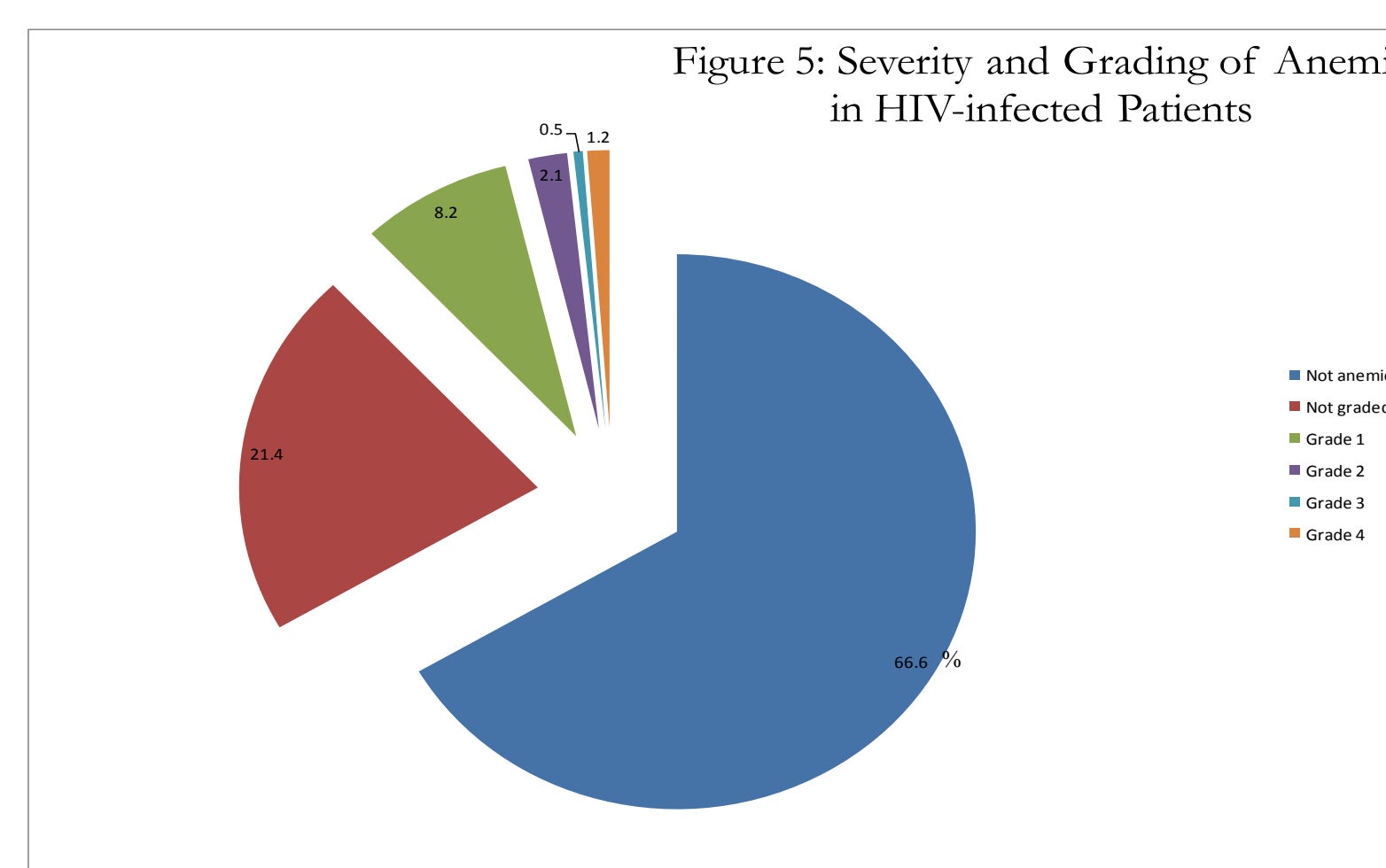


Table 1: Logistic regression of association of anemia and characteristics of AIDS patients in five outpatient clinics of the project "Initiating and Expanding HIV Out-patient Care and Treatment Services in Vietnam"

| Characteristic | Crude Prevalence Odds Ratio | 95% C.I. [†] | P-values [‡] | Adjusted Prevalence Odds Ratio | 95% C.I. [†] | P-values [‡] |
|--------------------------------------|-----------------------------|-----------------------|-----------------------|--------------------------------|-----------------------|-----------------------|
| Gender | | | 0.902 | | | 0.735 |
| Male | 1 | --- | | 1 | --- | |
| Female | 0.99 | (0.83-1.19) | | 0.97 | (0.80-1.18) | |
| CD4 at ART initiation | | | <.0001 | | | <.0001 |
| CD4 ≥250 | 1 | --- | | 1 | --- | |
| CD4 <250 | 2.95 | (2.15-4.04) | | 2.68 | (1.94-3.69) | |
| Not available | 2.71 | (1.86-3.96) | | 2.63 | (1.78-3.89) | |
| Ever had TB | 1.20 | (0.97-1.47) | | | | |
| Never had TB (ref) | 1 | --- | | | | |
| Current opportunistic infection (OI) | | | <.0001 | | | <.0001 |
| Had OIs | 1.87 | (1.55-2.26) | | 1.83 | (1.51-2.23) | |
| No OIs (ref) | 1 | --- | | 1 | --- | |
| Hepatitis B | | | 0.020 | | | <.0001 |
| Positive | 1.28 | (1.00-1.64) | | 1.31 | (1.02-1.69) | |
| Unknown | 0.76 | (0.56-1.03) | | 0.6 | (0.34-1.05) | |
| Negative (ref) | 1 | --- | | 1 | --- | |
| Hepatitis C | | | <.0001 | | | <.0001 |
| Positive | 0.62 | (0.51-0.56) | | 0.57 | (0.46-0.70) | |
| Unknown | 0.75 | (0.56-1.01) | | 1.09 | (0.64-1.85) | |
| Negative (ref) | 1 | --- | | 1 | --- | |
| Ecological zone | | | 0.038 | | | 0.003 |
| Zone 2 (Red River Delta) | 1.21 | (1.01-1.46) | | 1.37 | (1.12-1.67) | |
| Zone 7 (Mekong River Delta) | 1 | --- | | 1 | --- | |

[†] C.I. Confidence interval

[‡] Wald chi-squared p-value

ROC: Acceptable Discrimination (attached curve), c=0.63

GOF=0.72

Grey filled color indicates significant factors (p<.05 or sstay=.05) that were kept in the model in the backward elimination.

Gender was included, using include option (option=1).

Interaction and collinearity were assessed.

Results

- Patients with CD4<250, opportunistic infections, and those from the Red River Delta region were more likely to be anemic (POR=2.68, 95%CI: 1.94-3.69; POR=1.83, 95%CI: 1.51-2.23 and POR=1.37; 95%CI: 1.12-1.67 respectively-Table 1)

Table 2. Death and censoring status of patients with HIV/AIDS to the time of chart abstraction in five outpatient clinics of the project "Initiating and Expanding HIV Out-patient Care and Treatment Services in Vietnam".

| Patient status | N=2403 | % | note |
|---|--------|-----|----------|
| Died | 313 | 13 | died |
| Monitored and on ART | 1950 | 81 | censored |
| Monitored but not on ART | 2 | 0.1 | censored |
| Transferred to other clinics | 68 | 2.9 | censored |
| No visits in 3 months (lost-to-follow-up) | 70 | 3 | censored |

- Total follow up time to the date of chart abstraction was 33,671 months for 2,403 patients; Death was observed in 313 patients
- Mortality rate was 9.3/1,000 person-months
- Survival rate was significantly lower among patients with anemia (HR = 2.22; 95%CI, 1.75-2.82), and severe anemia (HR= 3.81; 95%CI, 2.32-6.24), controlling for gender, CD4, cotrim prophylaxis, current ART and ART history.

Figure 7: Kaplan-Meier Estimate of Time to Death HIV-infected Patients with and without Severe Anemia (Hgb<6.9-grades 3&4)

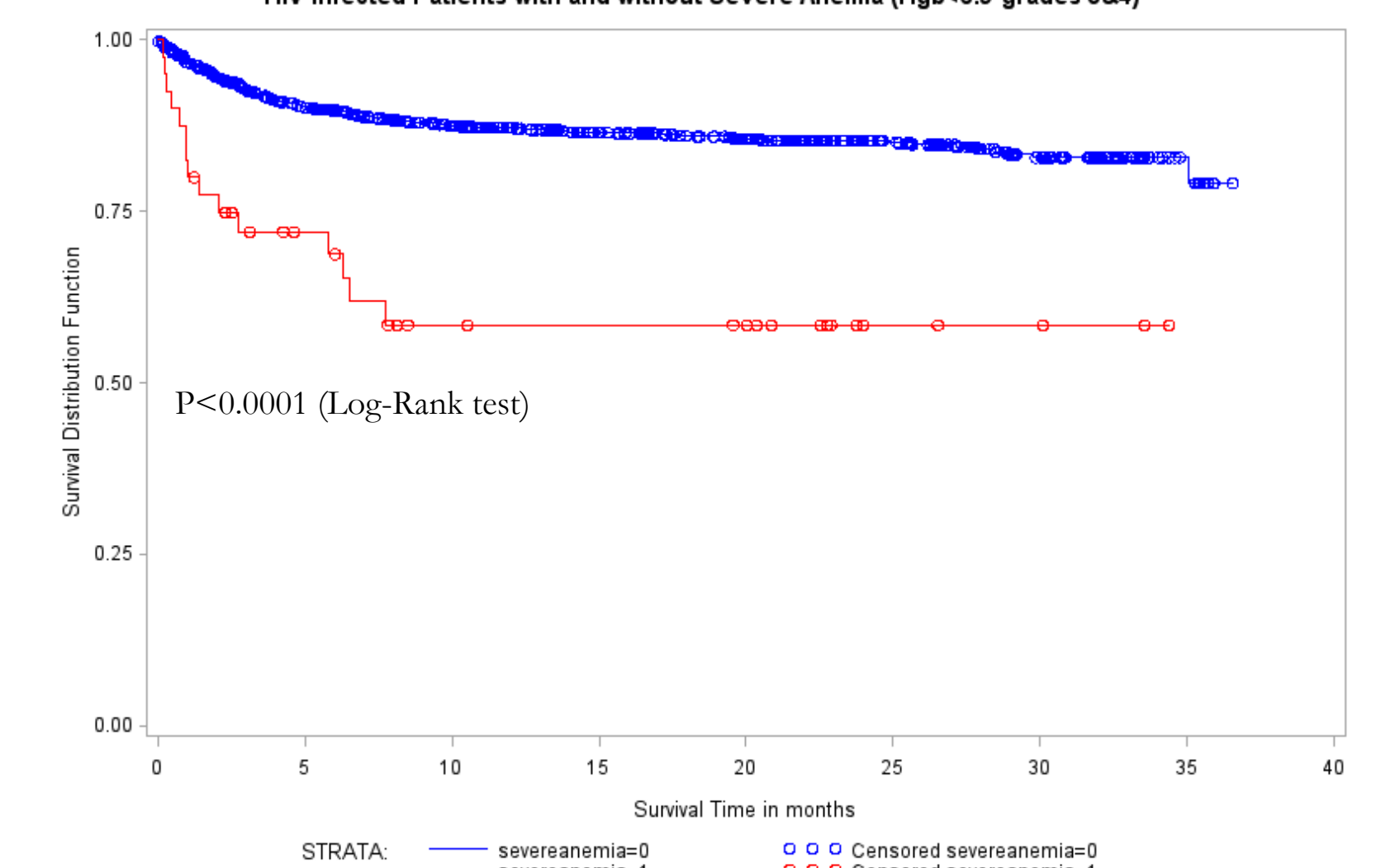
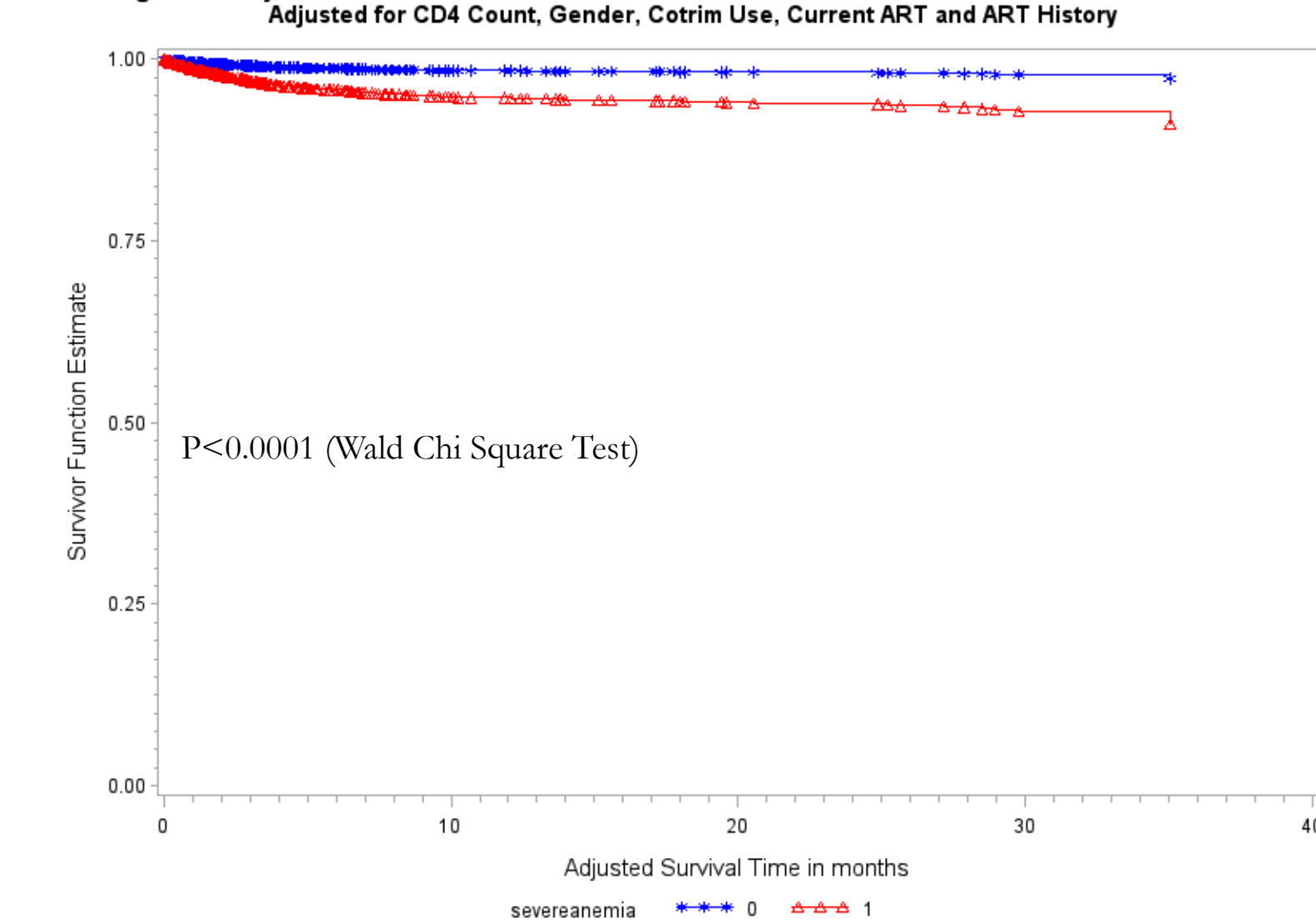


Figure 8: Adjusted Survival Curves for HIV-infected Patients with and without Severe Anemia Adjusted for CD4 Count, Gender, Cotrim Use, Current ART and ART History



Conclusions/Recommendations

- Anemia is prevalent among HIV-infected patients in Vietnam
- Prevalence of anemia in this AIDS cohort was two times higher than the general population in Vietnam (61% vs 30%)
- Survival rate in anemic patients is significantly lower than non-anemic patients after adjusting for other factors
- Strengthening anemia management should increase survival rate in HIV-infected patients
- Further studies on causes of anemia in HIV-infected patients are needed.

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